By Stephen F. Eckel, PharmD, MHA, BCPS

Making the Case for **Wireless Smart Pumps**

At the University of North Carolina Hospital (UNCH), a 726-bed tertiary care hospital located in Chapel Hill, the pharmacy department implemented smart pumps about five years ago. We began with a two-week beta test of the smart pump system in a 16-bed intensive care unit; the documented safety net provided by the drug library during this short trial drove our decision to adopt these IV pumps facility-wide. Since that time, we also have implemented smart PCA and pediatric syringe pumps, and we will soon implement smart epidural pumps.

Some key lessons we have learned over the past five years are as follows:

- **Education must be continuous:** Given the turnover and addition of new nurses, it is essential to educate staff on how to use the drug library, when to use it, and what it contains. While many organizations complete this task at the outset, a structure for ongoing education needs to be developed. Our organization has integrated pump education and smart pump teaching into our new nurse orientation and the contents of the drug library are on our Web site for anyone to review.
- **Understand the role of the Pharmacy & Therapeutics (P&T) Committee:** We asked the P&T Committee to approve our first drug library. Because the implementation of smart pumps required us to standardize all concentrations, and since the P&T Committee approve all of our clinical guidelines, it was a natural extension to have them continue to approve all library changes. Over time, this approach has turned out to be strategically sound. When a physician group recommends a change to a concentration or a dosing unit, these requests often conflict with what other physicians have requested. To avoid putting the pharmacy department (or a single pharmacist) in the middle of these issues, the P&T Committee works with the physicians to make the best decision for the organization.
- **Include all medications in the drug library:** In order to simplify the process for our nursing staff, we have attempted to load all medications or therapeutic classes (IV fluids, antibiotics, chemotherapy, etc.) in the pump. Our goal is to simplify the process for the nurse programming the pump. Rather than wondering whether a specific drug is in the library, the nurse has everything they need in the library. This enables easier compliance with drug library use, and there is no need to provide instruction on programming the pump without using the drug library.

Solving Some Issues, Creating More

While these lessons learned helped us increase the adoption and use of the smart pumps, there were still issues remaining that we needed to overcome. For example, when a drug library required updating, we had to individually handle every single pump, using a hard-wire connection to upload the drug library. With over 1,000 pumps in our organization, significant manpower was required to successfully accomplish this task. Given the level of inconvenience, we averaged only one drug library change every 18 months, a process that also required significant support from the vendor. Taking this episodic approach to drug library updating created tension with our organization's formulary decision-making process. There were times when we decided not to change to a more cost-effective medication because we could not accommodate the manual update to the drug library. Other times, we knowingly made a decision to add or change a medication, recognizing that it would not be entered into the drug library for the same reason.

Photo courtesy of Baxter

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Extracting utilization data—another manual process—also was difficult. When nursing leadership requested data on compliance or on how certain medications were being used, we could not provide real-time data. We downloaded all data on the pumps when the drug libraries were updated, but it was not real-time, and some data was lost due to the infrequent updates and the limited data storage capacity on the pumps themselves. By taking a manual approach, our organization could not fully maximize the benefits of the technology, furthermore, we could not effectively use our data to change practice and then measure the impact of the change in a timely way.

Resolving Inefficiency Wirelessly

Our organization determined that wireless connectivity to the pumps would be necessary to overcome these obstacles. A wireless pump is in constant communication with a server, whereby real-time utilization data is compiled in a database. Various

Photo courtesy of CareFusion

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reports can be run from the database, incorporating both historical and current data. Analysis of recent changes and their impact can be done in real-time, allowing the organization to track its success.

A wireless interface also allows us to push changes to the drug library whenever we want. Without the wireless feature, a change to the formulary might not be made due to the inability, or infeasibility, of updating the drug library; or the change might be made with the staff simply accepting that the drug library will be incorrect until an update is time- or cost-feasible. With the wireless feature, an organization can take full advantage of the cost savings often attendant to formulary change, keep the drug library current, and have access to user data at any time.

Working with Administration

The above advantages were those we shared with hospital administration to justify the cost of upgrading our pumps to wireless as essential. In addition, there was overwhelming support from pharmacy, nursing, materials management, and biomedical engineering to make this change. The combination of staff support and tangible practice benefits indicated a priority for this technology in the budgeting process, and the money was set aside for the upgrade.

The Future of Wireless Smart Pumps

When considering the future of wireless smart pump technology, I envision the ability to perform auto-programming, whereby an order is entered into the

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WHERE TO FIND: Smart Pumps

www.findit.pppmag.com

Vendor	Reader Service Number
B. Braun Medical Inc	11
Cardinal Health	12
Hospira, Inc	13
Sigma International	14
Smiths Medical	16

Implementation Tips

When instituting smart pump technology for the first time, consider the following:

- **Test your wireless infrastructure to ensure it can support this technology**. The physical layout of many facilities makes it difficult to maintain a strong wireless signal without numerous access points. If your organization currently has multiple technologies using the wireless network, it is essential to confirm that there will be sufficient bandwidth in all patient care areas where pumps will be used.
- **Establish a communication strategy for educating staff on drug library updates**. Updating a drug library is usually a passive process: After the drug library is pushed, it is received and held in the cache of the pump until the pump is out of use for the changes to be initiated. The user has the option to update the drug library manually (similar to restarting a computer for software updates to take effect) or to wait until the pump is not expected to be in use. If the choice is to wait, the pump will continue to alert the user—and any subsequent users—that the new library is available until the update is performed.
- **Keep all pump users apprised of specific changes that will be made**. Finding an education strategy that works for your organization is critical. This could include emails, newsletters, posters, staff meetings, or other organizational strategies. Another option is placing stickers on products being prepared in the IV room that caution the nurse about a drug library change for that product.
- **Consider whether a trial run of the update process would benefit the organization**. After much discussion, UNCH decided to conduct a trial of the wireless update process, which proved beneficial. We wanted to implement some significant concentration changes but without knowing our adoption rate, our fear was that the pharmacy would begin dispensing new drug concentrations prior to a full update of all the pumps. This trial resulted in a successful update on 80% of the pumps by the end of the third week. If this would have been a real drug library change, the risk for incongruence between the concentration of the drug being prepared and the concentration programmed into any given pump was high, increasing the potential for a medication error. The decision to run a trial exposed areas of concern and allowed us to address these issues before a substantive drug library push.
- **When approaching a wireless drug library push, it is wise to clear the process through a committee of all involved stakeholders**. At UNCH, our committee consists of pharmacy, nursing, materials management, patient equipment, and biomedical engineering. Our discussions focus on scheduling, determining which staff will be assigned to the various roles during the update, and any concerns we have about the process. We also spend significant time discussing education plans, as the success of updates is dependent on them. Due to the critical nature of the education process, we drafted a policy detailing our educational plans and individual roles therein.
- **Establish a method to measure the success of a wireless drug library push**. At UNCH, after an individual has accepted a drug library update on a pump, a note is sent to the server. At the end of each day, a member of the biomedical engineering department emails a status update. Our goal is to have 80% of all drug libraries updated within a week of the push. By monitoring the progress daily, we can determine whether we are on track. This also allows us to evaluate the effectiveness of our education plan, as well as the integrity of the wireless network. This was accomplished when we did our first full drug library push.

pharmacy information system and immediately appears on the pump for that specific patient. The nurse would then scan the IV bag to provide a verification process. However, this would require the pump to be linked to a patient, which is currently not the case. Another benefit of this compatibility could be the inclusion of a mechanism that would determine how much fluid remains in the bag. Instead of pharmacy receiving a call from the nurse for a new bag, the pharmacy could predict when the bag is almost empty and send a replacement in advance of the call.

While such functionality is still theoretical, we can take advantage of the existing benefits of wireless technology today. At UNCH completing the move to wireless smart pump technology has not been a process without challenges and lessons learned along the way. However, having a basic understanding of the concepts discussed here can ease your organization's transition to enhanced smart pump technology. ■

Stephen F. Eckel, PharmD, MHA, BCPS, received both his BS and doctor of pharmacy from the University of North Carolina at Chapel Hill. Following a pharmacy practice residency at Duke University Medical Center, he began as a clinical pharmacist at the University of North Carolina Hospitals. He also completed a masters of health care administration from the UNC School of Public Health. Stephen is an assistant director of pharmacy and is residency program director for UNC Hospitals. He is responsible for managing all adult, pediatric, and ambulatory clinical services. He is also director of graduate studies in the division of pharmacy practice and experiential education at the University of North Carolina, Eshelman School of Pharmacy and heads the masters of science in hospital pharmacy administration program. Stephen is board certified as a pharmacotherapy specialist.